

## Description

# AUTOMOTIVE VEHICLE BODY HAVING TAILOR WELDED BLANKS

### BACKGROUND OF INVENTION

[0001] Field of the Invention

[0002] The present invention relates to an automotive body in which the door opening panels are formed from tailor welded blanks having different thicknesses of steel combined into a single assembly for use in a stamping press to form the left and right side door opening panels. The blanks are welded along a horizontal seam which is covered in one embodiment by a door and a pickup box, which is shingled over a portion of the cab, thereby eliminating the need for added metal finishing of the weld seam.

[0003] Disclosure Information

[0004] Automotive bodies, particularly those used in sedans and pickup trucks, typically use door opening panels for the

purpose of framing the doorways for passenger ingress and egress. Such door opening panels typically comprise several stampings welded into a complete assembly. Because of the requirements for managing energy in the event of a vehicle collision, door opening panels frequently require multiple reinforcements in the area of the door sills and other parts of the panel. Such reinforcements are provided at a great deal of expense because the reinforcement must be separately tooled, stamped, and welded to the door opening panel. Of course, spot welds which are visible often give rise to the need for expensive secondary metal finishing operations. Moreover, the quality control process is rendered much more difficult because a high percentage of the spot welds needed for the reinforcements must have high integrity in order for the finished vehicle to meet various customer requirements.

[0005] The present door opening panel solves the problems associated with prior art door opening panels by providing a heavier gauge thickness of metal in a lower portion of a blank used to form the door opening panel, and a lighter gauge portion of metal on the upper part of the blank. Advantageously, the weld line or seam between the upper and lower portions of the door opening panel blank is

concealed in the final construction to a very great extent by the hinges used to mount doors to the door opening panel, or by other hardware.

## **SUMMARY OF INVENTION**

[0006] An automotive vehicle body includes a floor structure, a roof, and a door opening panel welded to the floor structure and to the roof, with the door opening panel being formed from a tailor welded metal blank providing a first thickness of material for a lower portion of the door opening panel and a second thickness of material for an upper portion of the door opening panel. The lower and upper portions of the finished door opening panel are joined by an approximately horizontal weld joint.

[0007] According to another aspect of the present invention, the weld line joining the lower and upper portions of the door opening panel is linear. A door opening panel according to present invention may be formed from steel or aluminum or other metals known to those skilled in the art and suggested by this disclosure. The welding between the upper and lower portions of the tailor welded blank may be accomplished by laser welding or other types of welding known to those skilled in the art and suggested by this disclosure. In one embodiment, the lower portion

of the door opening panel will have a thicker gauge of material than the material comprising the upper portion of the door opening panel.

[0008] According to another aspect of the present invention, an automotive vehicle further comprises a pickup box having a leading end extending laterally outwardly and forward of the rear corner of said door opening panel so as to conceal a portion of the weld line joining the upper and lower parts of the door opening panel.

[0009] An automotive vehicle according to the present invention further includes a passenger door mounted over a portion of the weld line between the upper and lower parts of the door opening panel. The passenger doors may include a front passenger door and a rear passenger door with each of the doors being attached to a door opening panel with hinges mounted such that the doors overlies the weld line when closed. Those skilled in the art will appreciate in view of this disclosure that the present invention could be employed with numerous types of automotive vehicles, including, but not limited to sedans, trucks, vans, and other types of vehicles.

[0010] According to another aspect of the present invention, a door opening panel further includes an inner door opening

panel mounted to an interior portion of the door opening panel.

[0011] According to another aspect of the present invention, a method for fabricating and installing a door opening panel for an automotive vehicle comprises the steps of stamping a plurality of metal sub-blanks with said sub-blanks having at least two different gauge thicknesses, and joining the sub-blanks with the linear weld joint. The present method continues with the steps of stamping the welded sub-blanks so as to form a door opening panel, and welding said door opening panel to an automotive body such that the weld joint is oriented generally horizontally.

[0012] It is an advantage of the present invention that the present door opening panel provides secure mounting for doors and secure door sill area without the necessity of extra weight and cost and the associated difficulty of forming a part having a heavier gauge thickness in both the lower and upper portions of the door opening panel.

[0013] It is a further advantage of a method and system according to the present invention that the need for certain reinforcement parts and associated spot welding and metal finishing operations is eliminated.

[0014] It is a further advantage of a method and system according to the present invention that wind noise resistant inset passenger doors may be used without undesirable closed-door exposure of an unsightly weld seam. In the absence of the present invention, limousine-style doors would be the order of the day.

[0015] Other advantages, as well as objects and features of the present invention, will become apparent to the reader of this specification.

#### **BRIEF DESCRIPTION OF DRAWINGS**

[0016] Figure 1 is a perspective view of an automotive vehicle having a door opening panel and doors according to the present invention.

[0017] Figure 2 illustrates a tailor welded blank according to one aspect of the present invention.

[0018] Figure 3 shows a portion of a vehicle having a door opening panel according to the present invention.

[0019] Figure 4 is an exterior view of a finished door opening panel according to the present invention.

[0020] Figure 5 illustrates an interior view of a portion of a door opening panel according to the present invention.

#### **DETAILED DESCRIPTION**

[0021] As shown in FIG. 1, a vehicle has body 10 with a roof 14 and floor 16. Doors 15, which have an inset design, are hinged to body 10. The use of inset doors is facilitated by the present invention because the present door opening panel has only a single weld seam or line, located generally horizontally in a region which is covered over by door 15 when it is in the closed position.

[0022] Door opening panel 20 is joined by spot or fusion welding to both roof 14 and to floor 16. Those skilled in the art will appreciate in view of this disclosure, however, that door opening panel 20 could be joined to floor 14 and floor 16 by other means such as bonding, friction welding, riveting, other types of mechanical joining, and other types of welding processes known to those skilled in the art and suggested by this disclosure. As shown in FIG. 2, door opening panel 20 begins as tailor welded blank 26. In an example used in a pickup truck manufactured by Ford Motor Company of Dearborn, Michigan, blank 26 is about 80" long and about 68" high, with the lower portion 30 comprising steel having a thickness of about 2.2 mm, and with upper portion 32 of blank 26 having a thickness of about 1.2 mm. As is further shown in FIG. 2, weld 36 extends across blank 26 in a generally horizontal fashion.

This orientation of weld 36 promotes the impressive savings by the present invention in terms of processing time, material cost, and weight of the finished product.

[0023] As shown in FIG. 4, hinges 40 and 44 are positioned upon the heavier gauge metal of lower portion 30, so that door 15 conceals a portion of weld 36 in the finished vehicle.

FIG. 3 shows a further concealment of weld line 36, inasmuch as side panel 48 of pickup box 46 has a leading end 50 which extends laterally, outwardly and forward of the rear corner 21 of door opening panel 20. In essence, side panel 48 overlies weld line 36 much as a roofing shingle overlies the parting line between other adjacent shingles.

[0024] FIG. 5 illustrates an inner portion of door opening panel 20 in which member 52 is applied for the purpose of allowing the mounting of trim parts (not shown), and also to fill out the section of the door opening panel. Added reinforcement is not required in the lower portion of door opening panel 20 which forms a portion of the door sill of body 10. This underscores but one advantage of the current system and structure the elimination of several reinforcements which would otherwise be needed if a thinner gauge of metal appropriate for the upper portion of the door opening panel were to be employed for the entire



panel.

[0025] According to the present invention, a method for fabricating and installing door opening panel 20 for an automotive vehicle includes the steps of stamping tailor welded blank 26 as shown in FIG. 2 to produce door opening panel 20 shown in FIG. 4 as having generally horizontal weld seam 36, followed by welding door opening panel 20 to roof 14 and floor 16 of body 10, as shown in FIG. 1, while maintaining the generally horizontal orientation of weld 36.

[0026] Although the present invention has been described in connection with particular embodiments thereof, it is to be understood that various modifications, alterations, and adaptations may be made by those skilled in the art without departing from the spirit and scope of the invention set forth in the following claims.